

Mark B

WHAT IS CLAIMED IS:

1. An optical instrument, comprising:
an optical element; and
a detector for detecting an impurity
concentration in an ambience containing a space
surrounding the optical element.
2. An optical instrument, comprising:
an optical element;
a detector for detecting an impurity
concentration in an ambience containing a space
surrounding the optical element; and
means for producing information of impurity
concentration on the basis of an output of said
detector.
3. An optical instrument, comprising:
an optical element;
a detector for detecting an impurity
concentration in an ambience containing a space
surrounding the optical element; and
means for informing an abnormal concentration
on the basis of an output of said detector.
4. An optical instrument, comprising:
an optical element;
a detector for detecting an impurity

concentration in an ambience containing a space
surrounding the optical element; and
a controller for controlling said optical
element on the basis of an output of said detector.

5. An optical instrument according to any one of
Claims 1 - 4, further comprising means for putting the
ambience in a state purged with a gas substantially
not absorbing light to be propagated through the
optical element.

10 6. An optical instrument according to Claim 5,
wherein the gas comprises a dry air or an inactive gas
such as a nitrogen gas and a helium gas.

15 7. An optical instrument according to Claim 6,
wherein the light comprises deep ultraviolet rays
having a wavelength not longer than 200 nm.

20 8. An optical instrument according to Claim 7,
wherein the inactive gas comprises a helium gas.

25 9. An optical instrument according to Claim 6,
wherein the light comprises deep ultraviolet rays
having a wavelength of about 248 nm.

10. An optical instrument according to any one of

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Claims ^{1 - 4} ~~1 - 10~~, further comprising an excimer laser as a light source for producing the light.

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Claims ^{1 - 4} ~~1 - 10~~, wherein said optical instrument is an exposure apparatus including (i) means for holding one of a mark and a reticle, (ii) an illumination optical system for illuminating a pattern of the mask or the reticle with the light, and (iii) means for holding a wafer to be exposed with the pattern.

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12. An optical instrument according to Claim 11, further comprising a projection optical system for projecting the pattern onto the wafer with use of the light, wherein said projection optical system is provided by (i) refractive elements only, (ii) reflective elements only, or (iii) a combination of refractive and reflective elements.

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13. An optical instrument according to any one of Claims ^{1 - 4} ~~1 - 12~~, wherein said detector has a sensor for detecting a concentration of an organic substance.

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14. An optical instrument according to Claim 13, wherein the concentration of the organic substance is controlled so that the total amount of organic substance in a gas inside said optical instrument

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becomes not greater than 1 $\mu\text{g}/\text{m}^3$.

15. An optical instrument according to Claim 14,
wherein the concentration of the organic substance is
controlled so that each concentration of carboxylic
acids, aldehydes, esters, phenols, phthalates,
phthalic acids, amines, and amides is kept at 0.01
 $\mu\text{g}/\text{m}^3$ or less.

16. A device manufacturing method, comprising the
steps of:

exposing a wafer with a device pattern by use
of an optical instrument as recited in any one of
Claims ¹⁻⁴ ~~1-15~~; and
developing the exposed wafer.